

**Patent claims**

1. Pyrogenically prepared zinc oxide powder having a BET surface area of from 10 to 200 m<sup>2</sup>/g, characterised in that
  - 5     -     it is in the form of aggregates,
  - the aggregates being composed of particles having different morphologies,
  - and
  - 0-10 % of the aggregates being in a circular form,
  - 10    -     30-50 % of the aggregates being in an ellipsoidal form,
  - 30-50 % of the aggregates being in a linear form,
  - 20-30 % of the aggregates being in a branched form.
2. Pyrogenically prepared zinc oxide powder according to claim 1, characterised in that the tamped density,
  - 15     determined according to DIN ISO 787/11, is at least 150 g/l.
3. Pyrogenically prepared zinc oxide powder according to claims 1 or 2, characterised in that the aggregates
  - 20     have
  - a mean projected aggregate surface area of less than 10,000 nm<sup>2</sup>
  - an equivalent circle diameter (ECD) of less than 100 nm and
  - 25     -     a mean circumference of less than 600 nm.
4. Pyrogenically prepared zinc oxide powder according to claims 1 to 3, characterised in that the amount of lead is not more than 20 ppm, the amount of arsenic is not more than 3 ppm, the amount of cadmium is not more than
  - 30     15 ppm, the amount of iron is not more than 200 ppm, the amount of antimony is not more than 1 ppm and the amount of mercury is not more than 1 ppm.
5. Process for the preparation of the zinc oxide powder according to claims 1 to 4, characterised in that

- a starting mixture containing zinc vapour, a combustible gas and steam or a mixture of steam and carbon dioxide
  - is reacted in a flame with an oxygen-containing gas in an oxidation zone,
  - the hot reaction mixture is cooled in a quenching zone and the solid material is separated from the gas stream,
  - the amount of oxygen in the oxidation zone being greater than the amount necessary for the complete oxidation of the combustible gas and the zinc vapour.
6. Process according to claim 5, characterised in that the zinc vapour is obtained in a reductive vaporisation zone by vaporising zinc powder by means of a stream of inert gas in a centrally arranged pipe by means of an externally arranged flame which is generated by reaction of a combustible gas and an oxygen-containing gas, the combustible gas being present in a stoichiometric excess relative to the oxygen content of the oxygen-containing gas.
7. Process for the preparation of the zinc oxide powder according to claims 1 to 4, characterised in that the vaporisation of the zinc powder and the oxidation to zinc oxide are carried out inside a reactor, wherein
- in a reductive vaporisation zone, zinc powder is metered in a centrally arranged pipe by means of a flame arranged around the centrally disposed pipe, in which the flame is generated by reaction of a combustible gas with an oxygen-containing gas,
  - the combustible gas and the oxygen-containing gas being supplied in separate pipes arranged concentrically around the central pipe, and

- the combustible gas being present in a stoichiometric excess relative to the oxygen content of the oxygen-containing gas,
- and then an excess of oxygen in the form of an oxygen-containing gas is fed into the gas stream from the reductive vaporisation zone, so that the excess combustible gas and the zinc vapour from the vaporisation zone are oxidised completely in the oxidation zone,
- then the hot reaction mixture is cooled in a quenching zone and the solid material is separated from the gas stream.
8. Use of the pyrogenically prepared zinc oxide powder according to claims 1 to 4 as a constituent of sun protection compositions for protection against UV radiation, as a vulcanisation aid, in plastics and surface coatings as a UV absorber, as a crosslinking agent or catalyst in the curing or polymerisation of plastics or plastics monomers, in synthetic resins, in pharmaceutical and cosmetic preparations as an antifungal or antibacterial additive, in the preparation of ceramics, as a catalyst or catalyst support.